

## **Appendix C**

### **Intensive Survey Report**

Contract No. 68-C-02-109  
Task Order 2003-0003

Intensive Survey Report

Date: October 31, 2003

# TMDL Development for Dissolved Oxygen and Nutrients for Bayou Lafourche Subsegment (020401) in the Barataria Basin, Louisiana

***Prepared for:***

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**U.S. Environmental Protection Agency**

***Submitted by:***

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## A. Introduction

Cadmus team staff conducted an intensive survey on September 23, 2003 to collect additional data to support the development of Total Maximum Daily Loads (TMDLs) for dissolved oxygen (DO) and nutrients in Bayou Lafourche Subsegment 020401. All sampling was conducted in accordance with the EPA approved Field Sampling Quality Assurance Project Plan (QAPP) that was developed for the Bayou Lafourche intensive survey field work. *In situ* measurements and analytical samples were collected from three locations in Bayou Lafourche and from two major tributaries to the subsegment. A summary of sample station locations and the data collected at each location is provided below in Table 1. The station locations was determined using a handheld global positioning system (GPS) unit (Garmin GPS 48).

No flow measurements or hydrogeometric survey measurements were taken during this intensive survey. Real-time flow rates were obtained from U.S. Geological Survey (USGS) for the Donaldsonville (USGS Gauge Number 07381401), Thibodaux (USGS Gauge Number 07338100), and Company Canal (USGS Gauge Number 07381350). No real-time flow data for the Larose and Canceled Canal sites exist. Hydrogeometric data for the Bayou Lafourche subsegment were obtained from Mashriqui and Kemp (Bayou Lafourche Freshwater Diversion Wetlands Restoration Project (PBA 20) HEC-RAS and HEC-6 Hydrologic Modeling).

**Table 1. Summary of Sample Locations and Information Collected**

| Station Identification | Sampling Location  | Recorded GPS Location           | Number of Containers Collected | Sampling and Measurements |
|------------------------|--|---------------------------------|--------------------------------|---------------------------|
| Station 0023           | LDEQ Routine Monitoring Station 0023 near Donaldsonville | N 30°05'48.9"<br>W 91° 00'21.4" | 8                              | 1, 2                      |
| Station 0293           | LDEQ Routine Monitoring Station 0293 near Thibodaux      | N 29°47'56.3"<br>W 90°49'04.0"  | 4                              | 1, 2                      |
| Station 0111           | LDEQ Routine Monitoring Station 0111 near Larose         | N 29°34'22.1"<br>W 90°23'03.0"  | 12                             | 1                         |
| Company Canal          | Company Canal  | N 29°38'51.3"<br>W 90°32'23.7"  | 4                              | 1, 2                      |
| Canceled Canal         | Canceled Canal   | N 29°54'01.5"<br>W 90°59'21.7"  | 4                              | 1                         |

1. Water quality (Total phosphorus, dissolved ortho phosphorus, ammonia, total Kjeldahl nitrogen, nitrate plus nitrite, total suspended solids, carbonaceous biochemical oxygen demand, and chlorophyll a), *in situ* physiochemical measurements (pH, conductivity, temperature, DO, Secchi depth, chlorides concentration), depth, width, and physical description.

2. Real-time flow rates as recorded by USGS.

## **B. Quality Assurance/Quality Control (QA/QC)**

### **B.1. Field QA/QC**

In situ parameters (DO, pH, conductivity, and temperature) were measured in duplicate using a YSI 650 Multi-meter and a Horiba U-10 Multi-meter. Field chloride concentrations were measured using a Hach Quantab kit. The YSI 650 and Horiba U-10 meters were calibrated at field conditions prior to sampling. Each meter was compared against readings from a National Institute of Standards and Technology (NIST) traceable thermometer. Both meters were found to be within the acceptable performance criteria for temperature that is listed in Table A-4 (Performance Criteria for DQOs for *In situ* Measurements) in the Field Sampling QAPP. (All instruments agree within 0.5 degrees Celsius [°C]).

During the in-field calibration of the Horiba U-10 Multi-meter, DO and pH measurements were erratic resulting in error messages. The instrument operator's manual was consulted, but DO and pH probe calibrations could not be rectified in the field. Temperature and conductivity measurements appeared acceptable. Calibration of the YSI 650 Multi-meter was successful and was determined to be acceptable according to the Field Sampling QAPP. Therefore, the YSI 650 Multi-meter was used as the primary measurement tool for pH, conductivity, DO, and temperature, and the Horiba U-10 Multi-meter was used to take duplicate measurements of conductivity and temperature. Copies of the field log notes and field data sheets used to document the field activities are included in this report as Attachment A.

### **B.2. Laboratory QA/QC**

A summary of laboratory analytical results are included in this report in section C.2 and the complete results are included as Attachment B. Sampling precision and the precision of laboratory analyses were assessed by collecting one set of duplicate samples at the Donaldsonville location (Station 0023). Sampling accuracy and matrix interference was assessed by the contract laboratory using laboratory control spikes and matrix spikes for samples collected at the Larose location (Station 0111). Results of sampling duplicates, laboratory control spikes, and matrix spike duplicates were found to be within the data quality objectives (DQOs) required in the Field Sampling QAPP.

### **B.3. Field Sampling Summary**

Sampling began at the Larose location and proceeded in the upstream direction, ending at the Donaldsonville. A brief description of the sampling station location and weather observations during sampling are provided below for each sampling locations in the sequence that station was sampled. *In situ* measurements are summarized below in Table 2 in section C.1. Analytical results are summarized in Table 4 in section C.2. Detailed results of *in situ* measurements and analytical results are presented

in Attachment B.

### **B.3.1. LDEQ Routine Monitoring Station 0111 near Larose**

The Cadmus team arrived at the site at 9:45 am. The Louisiana Department of Environmental Quality (LDEQ) continuous monitoring location was not accessible due to steady automobile traffic. Due to safety concerns, the location for sampling was established near a retaining wall on the east bank of Bayou Lafourche upstream of Bayou Lafourche's intersection with the Intracoastal Waterway. Sunny conditions were observed during sampling. The water was calm and there was a slight breeze from the east. Infrequent boat traffic caused some wake/wave action at the sample point. There was no observable flow in Bayou Lafourche or the Intracoastal Waterway. Water depth at the sample point was 8.5 feet. Discrete samples were collected from 1 meter below the water surface. Three sets of analytical samples were collected including one analytical set (MS0111), one matrix spike set (MS0111MS), and one matrix spike duplicates set (MS0111MSD).

### **B.3.2. Company Canal**

The Cadmus team field survey crew arrived at Company Canal at approximately 12:00 pm. A sample location was established at a retention wall located on the south bank of Company Canal approximately 200 feet west of where Company Canal intersects Bayou Lafourche. Sunny conditions were observed during sampling and there was a slight breeze. The water depth at the sample location was approximately 8.0 feet. One set of discrete analytical samples (CAN0001) was collected from 1 meter below the water surface.

### **B.3.3. LDEQ Routine Monitoring Station 0293 near Thibodaux**

The Cadmus team field survey crew arrived at the Thibodaux site at approximately 1:38 pm. The monitoring station was accessed from the bridge crossing. Sunny conditions were observed during sampling and there was a slight breeze. The water in the Bayou Lafourche appeared turbid and relatively high in suspended sediment. The measured depth of water at the sample location was 6.5 feet. A discernable flow was observed in the Bayou. One set of discrete analytical samples (MS0293) was collected from 1 meter below the water surface.

### **B.3.4. Canceled Canal**

The Cadmus team field survey crew arrived at Canceled Canal at approximately 3:00 pm. A sampling location was established on the downstream side of the LA 1 bridge crossing, which is located on the west bank of Bayou Lafourche. A culvert crossing was observed approximately 100 feet downstream of the sample location. The measured water depth at the sample location was 5.0 feet.

No flow was observed during sampling. Sunny, hot, and calm conditions were observed during sampling. One set of discrete analytical samples (CAN0002) was collected from 1 meter below the water surface.

### B.3.5. LDEQ Routine Monitoring Station 0023 near Donaldsonville

The Cadmus team field survey crew arrived at the sample site at approximately 4:00 pm. Due to heavy traffic, the LDEQ continuous monitoring station located on the downstream side of the bridge crossing could not be accessed. Samples were collected instead from the upstream side of the bridge. The measured water depth at the sample location was 3.4 feet. There was a discernable flow in the Bayou. Partly cloudy conditions were observed at the site. Two sets of discrete analytical samples (MS0023A and MS0023B) were collected from mid-depth.

### B.4. Sampling Preservation and Handling

All analytical samples were preserved on ice immediately following collection and were transported to Baton Rouge, Louisiana, for shipping the same day. Prior to shipping, chain-of custody forms were completed and shipping containers were sealed. All samples were analyzed within recommended and regulatory maximum holding times as listed in Table 3 provided on the following page.

## C. Sampling Results

### C.1. Field Sampling Results

The *in situ* measurements including ambient and water temperature, secchi disk depth, pH, DO, and chloride recorded at the five sampling locations are presented in Table 2 below.

**Table 2. Summary of *In situ* Measurements for Bayou Lafourche Field Survey**

| Sample Identification | Time  | Ambient Temp °C | Water Temp °C | Secchi Depth inches | pH   | Cond. µS/cm | DO mg/L | Chloride <sup>2</sup> mg/L |
|-----------------------|-------|-----------------|---------------|---------------------|------|-------------|---------|----------------------------|
| MS 0111               | 11:20 | 24.30           | 27.48         | 20.4                | 6.42 | 435         | 5.83    | 69                         |
| Company Canal         | 12:00 | 23.57           | 27.12         | 20.4                | 7.00 | 318         | 6.66    | <22                        |
| Station 0293          | 13:38 | nr <sup>1</sup> | 26.46         | 12.0                | 7.35 | 329         | 6.73    | <22                        |
| Cancienne Canal       | 15:00 | 25.08           | 25.25         | 18.0                | 7.43 | 356         | 4.39    | <22                        |
| Station 0023          | 16:00 | 28.61           | 26.46         | 8                   | 7.72 | 340         | 7.49    | <22                        |

1. Measurement not recorded.

2. Data reported as <(less than) because 22 mg/L is below the field tab measurement range.

## **C.2. Analytical Sampling Results**

Table 4 presents a summary of the laboratory analysis for the instream water quality samples collected at the five locations in the Bayou Lafourche. The parameters measure include CBOD, chlorophyll, phosphate, and nitrogen. Table 4 only shows the final values for these parameters.

**Table 3. List of Water Quality Sampling Parameters, Methods, and Supporting Information**

| Parameter                       | EPA Approved Analytical Method | Preservation   | Holding Times Recommended /Regulatory Maximum | Detection Limits (mg/L) | Container                 | Volume Required (mL) |
|---------------------------------|--------------------------------|--|---|-------------------------|---------------------------|----------------------|
| Total phosphorus                | LAC10-115-01-1D                | H <sub>2</sub> SO <sub>4</sub> to pH <2<br>Refrigerate at 4°C  | 28 days                                       | 0.02                    | High-density polyethylene | 100                  |
| Dissolved ortho phosphorus      | LAC10-115-01-1A                | Filter<br>Refrigerate at 4°C                                   | 24 hours/48 hours                             | 0.02                    | High-density polyethylene | 50                   |
| Ammonia                         | GLAC10-107-06-1J               | H <sub>2</sub> SO <sub>4</sub> to pH <2,<br>Refrigerate at 4°C | 7 days/28 days                                | 0.1                     | High-density polyethylene | 400                  |
| Total Kjeldahl Nitrogen (TKN)   | PAI DK03                       | H <sub>2</sub> SO <sub>4</sub> to pH <2<br>Refrigerate at 4°C  | 7 days/28 days                                | 0.3                     | High-density polyethylene | 500                  |
| Nitrate plus Nitrite (as N)     | EPA 353.2                      | H <sub>2</sub> SO <sub>4</sub> to pH <2<br>Refrigerate at 4°C  | None/28 days                                  | 0.1                     | High-density polyethylene | 100                  |
| Total suspended solids (TSS)    | USGS I-3765-85                 | Refrigerate at 4°C   | 7 days  | 5                       | High-density polyethylene | 100                  |
| Carbonaceous biochemical oxygen | SM 5210B                       | Refrigerate at 4°C   | 6 hours/48 hours                              | 2                       | High-density polyethylene | 2,000                |
| Chlorophyll a                   | SM 10200H2                     | Refrigerate at 4°C   | 21 days                                       | 0.001                   | Opaque high-              | 1,000                |

The detection limits and the analytical methods used in determining these values are presented in detail in Attachment B.

**Table 4. Summary of Instream Water Quality Parameters**

| Station            | CBOD<br>(mg/L) | Chlorophyll (µg/L) |    |    |            | Phosphate<br>(mg/L) |       | Nitrogen (mg/L)         |         |      |
|--------------------|----------------|--------------------|----|----|------------|---------------------|-------|-------------------------|---------|------|
|                    |                | A                  | B  | C  | Pheophytin | Ortho               | Total | Nitrite<br>+<br>Nitrate | Ammonia | TKN  |
| MS0023             | 4.5            | 5.5                | <1 | <1 | 8.5        | 0.08                | 0.27  | 0.8                     | <0.05   | 0.5  |
| MS0293             | 5              | 5                  | <1 | <1 | 9          | 0.1                 | 0.25  | 0.7                     | 0.09    | 0.6  |
| MS0111             | 5              | 13                 | <1 | <1 | 10         | 0.04                | 0.18  | 0.3                     | 0.08    | 0.7  |
| Company<br>Canal   | 6              | 22                 | 2  | 3  | 2          | 0.06                | 0.13  | 0.3                     | <0.05   | 0.48 |
| Cancienne<br>Canal | 5              | 4                  | <1 | <1 | 3          | 0.08                | 0.19  | 0.7                     | 0.09    | 0.7  |

## **ATTACHMENT A**

| Station/ Depth               | Measurement |       |           | Water Depth (ft) | Water Temp. °C | DO mg/L | Sp. Cond. µ/cm | pH s.u. | Sample S=Sed. W=Wat | No. of Containers | Notes<br>(Attach additional sheet or reference page in field notebook, if necessary) |
|------------------------------|-------------|-------|-----------|------------------|----------------|---------|----------------|---------|---------------------|-------------------|--|
|                              | Date        | Time  | Who       |                  |                |         |                |         |                     |                   |  |
| Larose/<br>1.0 m             | 9-23-03     | 11:20 | JR,<br>AS | 8.5              | 27.48          | 5.83    | 435            | 6.42    | W                   | 12                | GPS: N 29° 34' 22.1"; W 90° 23' 3.0"   |
|                              |             |       |           |                  |                |         |                |         |                     |                   | Weather/Stream conditions: Sunny; slight breeze; very slow flow                      |
|                              |             |       |           |                  |                |         |                |         |                     |                   | Problems corrective action: Horiba meter <sup>(1)</sup>                              |
| Company Canal/<br>1.0 m      | 9-23-03     | 12:00 | JR,<br>AS | 8.0              | 27.12          | 6.66    | 318            | 7.00    | W                   | 4                 | GPS: N 29° 38' 51.3"; W 90° 32' 23.7"  |
|                              |             |       |           |                  |                |         |                |         |                     |                   | Weather/Stream conditions: Sunny; slight breeze                                      |
|                              |             |       |           |                  |                |         |                |         |                     |                   | Problems corrective action: Horiba meter <sup>(1)</sup>                              |
| Thibodaux/<br>1.0 m          | 9-23-03     | 13:38 | JR,<br>AS | 6.5              | 26.46          | 6.73    | 329            | 6.73    | W                   | 4                 | GPS: N 29° 47' 56.3"; W 90° 49' 4.0"   |
|                              |             |       |           |                  |                |         |                |         |                     |                   | Weather/Stream conditions: Sunny; slight breeze; very slow flow                      |
|                              |             |       |           |                  |                |         |                |         |                     |                   | Problems corrective action: Horiba meter <sup>(1)</sup>                              |
| Cancienne Canal/<br>1.0 m    | 9-23-03     | 15:00 | JR,<br>AS | 5.0              | 25.25          | 4.39    | 356            | 7.43    | W                   | 4                 | GPS: N 29° 54' 01.5"; W 90° 59' 21.7"  |
|                              |             |       |           |                  |                |         |                |         |                     |                   | Weather/Stream conditions: Sunny; hot; calm; no flow                                 |
|                              |             |       |           |                  |                |         |                |         |                     |                   | Problems corrective action: Horiba meter <sup>(1)</sup>                              |
| Donaldsonville/<br>Mid-Depth | 9-23-03     | 16:00 | JR,<br>AS | 3.4              | 26.46          | 7.49    | 340            | 7.72    | W                   | 8                 | GPS: N 30° 05' 48.9"; W 90° 00' 21.4"  |
|                              |             |       |           |                  |                |         |                |         |                     |                   | Weather/Stream conditions: Partly cloudy   |
|                              |             |       |           |                  |                |         |                |         |                     |                   | Problems corrective action: Horiba meter <sup>(1)</sup>                              |

(1) Refer to field notebook for explanation.

Projects (continued)

Bayou Lafourche DO/Nutrients  
TMDL (SUBSEGMENT 020401)  
EPA CONTRACT #68-C-02-108

9/22/03 TEMP CALIBRATION

STANDARD

- NIST-TRACEABLE
- S/N 2198
- INSCRIPTION: ERTCO
- CALIBRATION VALID - 10/2/05
- °C UNITS

| METER      | TEMP   | STANDARD | DIFF. |
|------------|--------|----------|-------|
| YSI 650    | 23.1°C | 23.2°C   | -.1°C |
| HORIBA U10 | 25.4°C | 25.6°C   | -.2°C |

9-23-03

Instrument Calibration  
AT LAKE ST. 5018

YSI 650MDS

HORIBA  
U-10

DO.

100.1%

Temp

28.65°C

24.6°C

pH

6.85/27.08 6.85

6.85

pH

9.99/27.03 9.99

10.00

Rebo 6.85/27.98 6.85 2pt

check 29.54 6.89

Cond

1000  $\mu$ S/cm 25.32 1000

0.000

Check  
17 x 5 Marks = 8.5' depth

Larose Sample Point  
3.0' depth to 8.5 ft. along wall.

Temp 27.48°C

Ambient Air 4135  $\mu\text{S}/\text{cm}$

24.30°C

Slight Breeze 0.21  $\text{g}/\text{L}$

Sunny 73.89 DO

H2O  $\text{mg}/\text{L}$  DO 5.03

6.42 pH

Auto Calibration

Hand U-10 Auto Cal.

No pH cal. 8706

check 4.48  $\text{mS}/\text{cm}$

Standard 4.49  $\text{mS}/\text{cm}$

Temp 25.6°C

pH 6.93

Standard 4.00

How do we measure

pH 7.37

Cond 0.321  $\text{mS}/\text{cm}$

DO 3.96  $\text{mg}/\text{L}$

Temp 27.7°C

Sat 0.01%

Poor calibration on pH  
and DO: Erratic readings  
pH off. Fr-4 reading  
on DO during Auto  
calib.

Ambient conditions ~85°F clear,  
Slight Breeze, water falling,  
Breeze from east; Infrared  
boat traffic (some warping)

GPS (Garmin GPS 40)

LSO 17°

LN 29° 34' 22.1"

W 91° 23' 03.0"

Photo #1 Looking west

Field Chloride Mors.  
(Hzech Quartzch)

69 mg/L Cl<sup>-</sup>

4 sample containers  
used for Larose samples

4 MS/MSD samples  
for all perennials  
Sample ID's  
MS0111 + MS0111MS  
+ MS0111MSD

Campy Canal (CANADIAN)

near Blaforse  
• Ripid Riv 23.57°C  
6.0 Depth 1200 PM

Temp 27.07°C → 27.12

• Cond 396  $\mu$ S/cm → 397

• 0.19 Sel 0.19

78.9  $\mu$ S/cm → 83.6

~~636 mg/L DO~~ 6.66 ug/L

~~686 pH~~ 7.00 pH

Horiz

pH 7.26

Cond .318  $\mu$ S/cm<sup>①</sup>

DO 2.56 mg/L

Temp 27.3°C

Sel 0.0'S

Sunny Slight Breeze  
No noticeable flow to Bay  
22 mg/L Cl very fels

SD = 1.7' Waypoint 234  
GPS N 29°38'51.3"  
W 90°38'23.7"

Sunny Slight Breeze - TWS  
Arrive 1338

1/16/02  
235 N 29°47'56.3"  
W 90°49'04.0"

6.5' Depth

SD 1.0'

YSI

Temp 26.46°C

329  $\mu$ S/cm

0.16 Sal

84.0 81.7 DO

6.73 6.61 mg/L DO

7.35 pH

Horiba from Crest

Bank due to access

problems

DO 5.65 Temp

pH 7.38 26.4

Cond. 265

Chlorides 22 ug/L

Collected MS 0293

Pencione Canal

GPS N 29°54'01.5"

W 90°59'21.7"

300 PM

Temp 25.25°C

Cond 356  $\mu$ S/cm

0.17 Sal

53.4 DO

4.39 mg/L DO

pH 7.43

Air Temp ~~24.55°C~~

25.08°C

No breeze

Sunny

DO 4.42 mg/L

Chlorides 22 ug/L

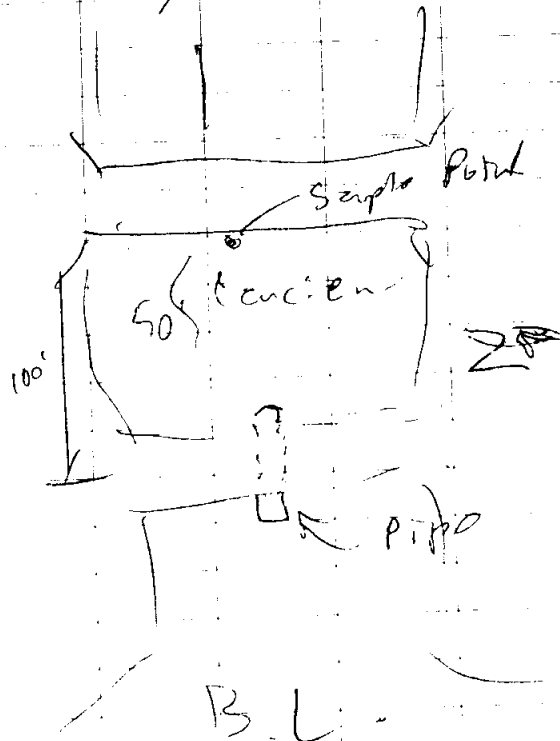
Horiba Temp 28.0

pH 7.26

Cond 288  $\mu$ S/cm

Sample collected then tested duplicate

Cancien CAN0002  
 SD 1.5'  
 Depth 5.0'  
 Sunny Hot  
 Trestle or LT 1  
 Very close



Pouz Idsonville  
 1:00 PM WP 23.7  
 N 30°05'48.9"  
 W 91°00'21.4"

Observable flow

Depth 1.2 2nd mark  
 $1.7 \times 2 = 3.4'$

Took readings and samples  
 on upstream side  
 due to access problems

SD 8"

YSI

Temp 26.46°  
 Cond 340  $\mu\text{S}/\text{cm}$   
 Sal 0.16  
 DO<sub>2</sub> 91.5% DO  
 DO 7.37  $\text{mg}/\text{L}$   
 pH 7.72

Ambient temp 28.61°C

Chlorides & O<sub>2</sub> made = 222g  
No letback rapid flow

Partly Cloudy

Est 1 ft/sec

Hor: bz

Took sample in

DO 6.17 mg/L

Temp. 28.8 °C

pH 7.26

Cond .285

Sent 2 packages of samples v. 2 Fed ex to lab 6

7:15 PM Arrived at office

7:18 PM Check YSI

DO 100.6 AM

Temp 25.13 24.612

pH 7.08 Temp 22.37 AM

Cond 1000 umhos 1001 umhos  
125/cm 22/cm

Hor: bz

pH 7

Temp (pH probe)

Cond

(SSI 1000 umhos)

Reading

7.00

1.05 mS/cm

① Conductivity measurement

Note = All discrete samples collected  
w/ bailers.

**ATTACHMENT B**



**HYGIENIC LABORATORY**

**Iowa's Environmental and  
Public Health Laboratory**

102 Oakdale Campus, H101 OH  
Iowa City, Iowa 52242-5002  
319-335-4500 Fax 319-335-4555  
[www.uhl.uiowa.edu](http://www.uhl.uiowa.edu)

October 20, 2003

Alexander Sheffield, P.E.  
Principal Engineer  
ARCADIS G&M, Inc.  
2900 West Fork Drive  
Suite 540  
Baton Rouge, Louisiana 70827

Mr. Sheffield:

Please find enclosed the water chemistry data package for the Bayou Lafourche DO/Nutrients TMDL – EPA Contract Number 68-C-02-108, Task Order 0-12. Included in this data package are the “Results of Analyses” for eight samples, a quality control summary for the internal QC performed by the University Hygienic Laboratory, and the original Sample Information/Chain of Custody form and custody seals. Also enclosed is an invoice/billing statement for the services performed for this project. A copy of this invoice/billing statement will be provided to the UHL Accounting section, as well. Please remit the balance of the analytical bill in full to:

Attention: Bayou Lafouche TMDL  
% Pamela Lenz, Business Manager  
University Hygienic Laboratory  
102 Oakdale Campus, #H101 OH  
Iowa City, Iowa 52242-5002

If you have any questions regarding the data package provided please contact me. The University Hygienic Laboratory appreciated the opportunity to provide analytical services for ARCADIS on this project. We look forward to doing business with you in the future.

Sincerely,

Michael D. Schueller  
Limnologist III, Project Manager

# University Hygienic Laboratory

## INVOICE

| Sample Number | Date Collected | Collection Site | Collector       | Test Name                      | Test Cost | Total Sample Cost |
|---------------|----------------|-----------------|-----------------|--------------------------------|-----------|-------------------|
| 200309650     | 9/23/2003      | mso111          | SHEFFIELD/RULEY | Ammonia Nitrogen as N          |           |                   |
|               |                |                 |                 | Nitrate + Nitrite as Nitrate N | \$60      |                   |
|               |                |                 |                 | Total Kjeldahl Nitrogen        |           |                   |
|               |                |                 |                 | Orthophosphate as P            | \$40      | \$185             |
|               |                |                 |                 | Total Phosphate as P           |           |                   |
|               |                |                 |                 | CBOD20                         | \$30      |                   |
|               |                |                 |                 | Total Suspended Solids         | \$15      |                   |
| 200309651     | 9/23/2003      | mso111 ms       | SHEFFIELD/RULEY | Chlorophyll                    | \$40      |                   |
|               |                |                 |                 | Ammonia Nitrogen as N          |           |                   |
|               |                |                 |                 | Nitrate + Nitrite as Nitrate N | \$60      |                   |
|               |                |                 |                 | Total Kjeldahl Nitrogen        |           |                   |
|               |                |                 |                 | Orthophosphate as P            | \$40      | \$185             |
|               |                |                 |                 | Total Phosphate as P           |           |                   |
|               |                |                 |                 | CBOD20                         | \$30      |                   |
| 200309652     | 9/23/2003      | mso111 msd      | SHEFFIELD/RULEY | Total Suspended Solids         | \$15      |                   |
|               |                |                 |                 | Chlorophyll                    | \$40      |                   |
|               |                |                 |                 | Ammonia Nitrogen as N          |           |                   |
|               |                |                 |                 | Nitrate + Nitrite as Nitrate N | \$60      |                   |
|               |                |                 |                 | Total Kjeldahl Nitrogen        |           |                   |
|               |                |                 |                 | Orthophosphate as P            | \$40      | \$185             |
|               |                |                 |                 | Total Phosphate as P           |           |                   |
| 200309653     | 9/23/2003      | can0001         | SHEFFIELD/RULEY | CBOD20                         | \$30      |                   |
|               |                |                 |                 | Total Suspended Solids         | \$15      |                   |
|               |                |                 |                 | Chlorophyll                    | \$40      |                   |
|               |                |                 |                 | Ammonia Nitrogen as N          |           |                   |
|               |                |                 |                 | Nitrate + Nitrite as Nitrate N | \$60      |                   |
|               |                |                 |                 | Total Kjeldahl Nitrogen        |           |                   |
|               |                |                 |                 | Orthophosphate as P            | \$40      | \$185             |
| 200309653     | 9/23/2003      | can0001         | SHEFFIELD/RULEY | Total Phosphate as P           |           |                   |
|               |                |                 |                 | CBOD20                         | \$30      |                   |
|               |                |                 |                 | Total Suspended Solids         | \$15      |                   |
|               |                |                 |                 | Chlorophyll                    | \$40      |                   |
|               |                |                 |                 | Ammonia Nitrogen as N          |           |                   |
|               |                |                 |                 | Nitrate + Nitrite as Nitrate N | \$60      |                   |
|               |                |                 |                 | Total Kjeldahl Nitrogen        |           |                   |

# University Hygienic Laboratory

## INVOICE

| Sample Number | Date Collected | Collection Site | Collector       | Test Name                      | Test Cost | Total Sample Cost |
|---------------|----------------|-----------------|-----------------|--------------------------------|-----------|-------------------|
| 200309654     | 9/23/2003      | ms0293          | SHEFFIELD/RULEY | Ammonia Nitrogen as N          |           |                   |
|               |                |                 |                 | Nitrate + Nitrite as Nitrate N | \$60      |                   |
|               |                |                 |                 | Total Kjeldahl Nitrogen        |           |                   |
|               |                |                 |                 | Orthophosphate as P            | \$40      | \$185             |
|               |                |                 |                 | Total Phosphate as P           |           |                   |
|               |                |                 |                 | CBOD20                         | \$30      |                   |
|               |                |                 |                 | Total Suspended Solids         | \$15      |                   |
| 200309655     | 9/23/2003      | can0002         | SHEFFIELD/RULEY | Chlorophyll                    | \$40      |                   |
|               |                |                 |                 | Ammonia Nitrogen as N          |           |                   |
|               |                |                 |                 | Nitrate + Nitrite as Nitrate N | \$60      |                   |
|               |                |                 |                 | Total Kjeldahl Nitrogen        |           |                   |
|               |                |                 |                 | Orthophosphate as P            | \$40      | \$185             |
|               |                |                 |                 | Total Phosphate as P           |           |                   |
|               |                |                 |                 | CBOD20                         | \$30      |                   |
| 200309656     | 9/23/2003      | ms0023-a        | SHEFFIELD/RULEY | Total Suspended Solids         | \$15      |                   |
|               |                |                 |                 | Chlorophyll                    | \$40      |                   |
|               |                |                 |                 | Ammonia Nitrogen as N          |           |                   |
|               |                |                 |                 | Nitrate + Nitrite as Nitrate N | \$60      |                   |
|               |                |                 |                 | Total Kjeldahl Nitrogen        |           |                   |
|               |                |                 |                 | Orthophosphate as P            | \$40      | \$185             |
|               |                |                 |                 | Total Phosphate as P           |           |                   |
| 200309657     | 9/23/2003      | ms0023-b        | SHEFFIELD/RULEY | CBOD20                         | \$30      |                   |
|               |                |                 |                 | Total Suspended Solids         | \$15      |                   |
|               |                |                 |                 | Chlorophyll                    | \$40      |                   |
|               |                |                 |                 | Ammonia Nitrogen as N          |           |                   |
|               |                |                 |                 | Nitrate + Nitrite as Nitrate N | \$60      |                   |
|               |                |                 |                 | Total Kjeldahl Nitrogen        |           |                   |
|               |                |                 |                 | Orthophosphate as P            | \$40      | \$185             |

**Total Bill - Please remit in full.**

**\$1,480**

**Due Date: November 30, 2003**



# Hygienic Laboratory

*The University of Iowa*

Date of report: 10-20-2003

|||||  
ALEX SHEFFIELD  
ARCADIS  
2900 WEST FORK DRIVE  
SUITE 540  
BATON ROUGE LA 70827

Sample Number 200309650  
Date Received 09-24-2003  
Project TMDL LOUISIANA  
Date Collected 09-23-2003 10:15  
Collection Site msol11  
Collection Town  
Description water  
Reference BAYOU LAFOURCHE TMDL  
Collector SHEFFIELD/RULEY  
Phone (225) 292-1004  
Purchase Order

Comments Upon receipt at the UHL sample meets standard acceptance criteria.

## Results of Analyses

### Carbonaceous BOD (20day)

| Analyte                   | Concentration<br>mg/L  | Quantitation Limit |
|---------------------------|--|--------------------|
| Carbonaceous BOD (20 day) | 5  | 2                  |
| Comments                  | 20 day Blank depletion associated with this sample averaged 2.03 mg/L. Reported results based on a 150 ml dilution are not corrected for excessive blank depletion. If corrected the 20 day CBOD would be < 4 mg/L |                    |

Date Analyzed: 09-25-2003

Method: SM 5210B

Analyst: RS/RWW

Verified: LF

### Chlorophyll Determination for Water

| Analyte                 | Concentration<br>ug/L | Quantitation Limit |
|-------------------------|-----------------------|--------------------|
| Chlorophyll A           | 13                    | 1                  |
| Chlorophyll B           | < 1                   | 1                  |
| Chlorophyll C           | < 1                   | 1                  |
| Corrected Chlorophyll A | 7                     | 1                  |
| Pheophytin              | 10                    | 1                  |

Date Analyzed: 10-07-2003

Method: SM 10200 H 2

Analyst: SMM

Verified: MK

### Orthophosphate using Lachet (water)

| Analyte              | Concentration<br>mg/L | Quantitation Limit |
|----------------------|-----------------------|--------------------|
| Ortho Phosphate as P | 0.04                  | 0.02               |

Date Analyzed: 09-25-2003

Method: LAC10-115-01-1A

Analyst: AB

Verified: TAB

Continued on next page...



# Hygienic Laboratory

*The University of Iowa*

Page 2  
Sample Number 200309650

## Total Suspended Solids

| Analyte                | Concentration<br>mg/L         | Quantitation Limit |
|------------------------|-------------------------------|--------------------|
| Total Suspended Solids | 90                            | 1                  |
| Comments               | <i>Dried at 103 degrees C</i> |                    |

Date Analyzed: 09-26-2003

Analyst: MAG

Method: USGS I-3765-85

Verified: BR

## Nitrate + Nitrite as Nitrate N (Water)

| Analyte                         | Concentration<br>mg/L | Quantitation Limit |
|---------------------------------|-----------------------|--------------------|
| Nitrate + Nitrite Nitrogen as N | 0.3                   | 0.1                |

Date Analyzed: 09-25-2003

Analyst: MAG

Method: EPA 353.2

Verified: TAB

## Ammonia Lachet

| Analyte               | Concentration<br>mg/L | Quantitation Limit |
|-----------------------|-----------------------|--------------------|
| Ammonia Nitrogen as N | 0.08                  | 0.05               |

Date Analyzed: 10-02-2003

Analyst: AB

Method: LAC10-107-06-1J

Verified: BR

## TKN using Lachet (water)

| Analyte | Concentration<br>mg/L | Quantitation Limit |
|---------|-----------------------|--------------------|
| TKN     | 0.70                  | 0.05               |

Date Analyzed: 10-08-2003

Analyst: AB

Method: PAI DK03

Verified: LF

## Total P (water) using Lachet

| Analyte              | Concentration<br>mg/L | Quantitation Limit |
|----------------------|-----------------------|--------------------|
| Total Phosphate as P | 0.18                  | 0.05               |

Date Analyzed: 10-07-2003

Analyst: AB

Method: LAC10-115-01-1C

Verified: TAB

## Description of units used within this report

mg/L - Milligrams per Liter

ug/L - Micrograms per Liter

Quant Limit - Lowest concentration reliably measured

Iowa Laboratory Certification No. 027. AIHA, NELAP, NVLAP, USEPA, and other credentials available upon request.

*If you have any questions please call Sherri Marine at 800/421-IOWA (4692) or 319/335-4500. Thank you.*

End of Report



# Hygienic Laboratory

*The University of Iowa*

Date of report: 10-20-2003

|||||  
ALEX SHEFFIELD  
ARCADIS  
2900 WEST FORK DRIVE  
SUITE 540  
BATON ROUGE LA 70827

Sample Number 200309651  
Date Received 09-24-2003  
Project TMDL LOUISIANA  
Date Collected 09-23-2003 10:15  
Collection Site msol111 ms  
Collection Town  
Description water  
Reference BAYOU LAFOURCHE TMDL  
Collector SHEFFIELD/RULEY  
Phone (225) 292-1004  
Purchase Order

Comments Upon receipt at the UHL sample meets standard acceptance criteria.

## Results of Analyses

### Carbonaceous BOD (20day)

| Analyte                   | Concentration<br>mg/L  | Quantitation Limit |
|---------------------------|--|--------------------|
| Carbonaceous BOD (20 day) | 5  | 2                  |
| Comments                  | 20 day Blank depletion associated with this sample averaged 2.03 mg/L. Reported results based on a 150 ml dilution are not corrected for excessive blank depletion. If corrected the 20 day CBOD would be < 4 mg/L |                    |

Date Analyzed: 09-25-2003

Method: SM 5210B

Analyst: RS/RWW

Verified: LF

### Chlorophyll Determination for Water

| Analyte                 | Concentration<br>ug/L | Quantitation Limit |
|-------------------------|-----------------------|--------------------|
| Chlorophyll A           | 10                    | 1                  |
| Chlorophyll B           | < 1                   | 1                  |
| Chlorophyll C           | < 1                   | 1                  |
| Corrected Chlorophyll A | 3                     | 1                  |
| Pheophytin              | 10                    | 1                  |

Date Analyzed: 10-07-2003

Method: SM 10200 H 2

Analyst: SMM

Verified: MK

### Orthophosphate using Lachet (water)

| Analyte              | Concentration<br>mg/L  | Quantitation Limit |
|----------------------|--|--------------------|
| Ortho Phosphate as P | 0.59   | 0.02               |
| Comments             | A spike of 0.50mg/l was added to sample. Recovery was 108.8%.<br>09/25/03 AB |                    |

Date Analyzed: 09-25-2003

Method: LAC10-115-01-1A

Analyst: AB

Verified: TAB

Continued on next page...



# Hygienic Laboratory

*The University of Iowa*

Page 2  
Sample Number 200309651

## Total Suspended Solids

| Analyte                | Concentration<br>mg/L         | Quantitation Limit |
|------------------------|-------------------------------|--------------------|
| Total Suspended Solids | 120                           | 1                  |
| Comments               | <i>Dried at 103 degrees C</i> |                    |

Date Analyzed: 09-26-2003

Analyst: MAG

Method: USGS I-3765-85

Verified: BR

## Nitrate + Nitrite as Nitrate N (Water)

| Analyte                         | Concentration<br>mg/L  | Quantitation Limit |
|---------------------------------|--|--------------------|
| Nitrate + Nitrite Nitrogen as N | 2.72   | 0.1                |
| Comments                        | <i>100 microLitres of 100 mg/L NOx stock standard into<br/>4 mL of sample for a spike level of 2.68 mg/L</i> |                    |

Date Analyzed: 09-25-2003

Analyst: MAG

Method: EPA 353.2

Verified: TAB

## Ammonia Lachet

| Analyte               | Concentration<br>mg/L | Quantitation Limit |
|-----------------------|-----------------------|--------------------|
| Ammonia Nitrogen as N | 0.07                  | 0.05               |

Date Analyzed: 10-02-2003

Analyst: AB

Method: LAC10-107-06-1J

Verified: BR

## TKN using Lachet (water)

| Analyte  | Concentration<br>mg/L  | Quantitation Limit |
|----------|--|--------------------|
| TKN      | 1.1  | 0.05               |
| Comments | <i>An increase of 0.50mg/l was added to sample. 87.6% 10/08/03ab</i> |                    |

Date Analyzed: 10-08-2003

Analyst: AB

Method: PAI DK03

Verified: TAB

## Total P (water) using Lachet

| Analyte              | Concentration<br>mg/L  | Quantitation Limit |
|----------------------|--|--------------------|
| Total Phosphate as P | 0.65   | 0.05               |
| Comments             | <i>A spike increase of 0.50 mg/l was added to sample. 93.4% 100703ab</i> |                    |

Date Analyzed: 10-07-2003

Analyst: AB

Method: LAC10-115-01-1C

Verified: TAB

## Description of units used within this report

mg/L - Milligrams per Liter

ug/L - Micrograms per Liter

Quant Limit - Lowest concentration reliably measured

Continued on next page...



# Hygienic Laboratory

*The University of Iowa*

Page 3

Sample Number 200309651

Iowa Laboratory Certification No. 027. AIHA, NELAP, NVLAP, USEPA, and other credentials available upon request.

*If you have any questions please call Sherri Marine at 800/421-IOWA (4692) or 319/335-4500. Thank you.*

End of Report



# Hygienic Laboratory

*The University of Iowa*

Date of report: 10-20-2003

|||||  
ALEX SHEFFIELD  
ARCADIS  
2900 WEST FORK DRIVE  
SUITE 540  
BATON ROUGE LA 70827

Sample Number 200309652  
Date Received 09-24-2003  
Project TMDL LOUISIANA  
Date Collected 09-23-2003 10:15  
Collection Site ms0111 msd  
Collection Town  
Description water  
Reference BAYOU LAFOURCHE TMDL  
Collector SHEFFIELD/RULEY  
Phone (225) 292-1004  
Purchase Order

Comments Upon receipt at the UHL sample meets standard acceptance criteria.

## Results of Analyses

### Carbonaceous BOD (20day)

| Analyte                   | Concentration<br>mg/L  | Quantitation Limit |
|---------------------------|--|--------------------|
| Carbonaceous BOD (20 day) | 5  | 2                  |
| Comments                  | 20 day Blank depletion associated with this sample averaged 2.03 mg/L. Reported results based on a 150 ml dilution are not corrected for excessive blank depletion. If corrected the 20 day CBOD would be < 4 mg/L |                    |

Date Analyzed: 09-25-2003  
Method: SM 5210B

Analyst: RS/RWW  
Verified: LF

### Chlorophyll Determination for Water

| Analyte                 | Concentration<br>ug/L | Quantitation Limit |
|-------------------------|-----------------------|--------------------|
| Chlorophyll A           | 14                    | 1                  |
| Chlorophyll B           | < 1                   | 1                  |
| Chlorophyll C           | < 1                   | 1                  |
| Corrected Chlorophyll A | < 1                   | 1                  |
| Pheophytin              | 26                    | 1                  |

Date Analyzed: 10-07-2003  
Method: SM 10200 H 2

Analyst: SMM  
Verified: MK

### Orthophosphate using Lachet (water)

| Analyte              | Concentration<br>mg/L  | Quantitation Limit |
|----------------------|--|--------------------|
| Ortho Phosphate as P | 0.57   | 0.02               |
| Comments             | A spike 0.50mg/l was added to sample. Recovery was 105.8%.<br>2.58% RPD. 09/25/03 AB |                    |

Date Analyzed: 09-25-2003  
Method: LAC10-115-01-1A

Analyst: AB  
Verified: TAB

Continued on next page...



# Hygienic Laboratory

*The University of Iowa*

Page 2  
Sample Number 200309652

## Total Suspended Solids

| Analyte                | Concentration<br>mg/L         | Quantitation Limit |
|------------------------|-------------------------------|--------------------|
| Total Suspended Solids | 63                            | 1                  |
| Comments               | <i>Dried at 103 degrees C</i> |                    |

Date Analyzed: 09-26-2003

Analyst: MAG

Method: USGS I-3765-85

Verified: BR

## Nitrate + Nitrite as Nitrate N (Water)

| Analyte                         | Concentration<br>mg/L  | Quantitation Limit |
|---------------------------------|--|--------------------|
| Nitrate + Nitrite Nitrogen as N | 2.83   | 0.1                |
| Comments                        | <i>100 microLitres of 100 mg/L NOx stock standard into<br/>4 mL of sample for a spike level of 2.68 mg/L</i> |                    |

Date Analyzed: 09-25-2003

Analyst: MAG

Method: EPA 353.2

Verified: TAB

## Ammonia Lachet

| Analyte               | Concentration<br>mg/L | Quantitation Limit |
|-----------------------|-----------------------|--------------------|
| Ammonia Nitrogen as N | 0.07                  | 0.05               |

Date Analyzed: 10-02-2003

Analyst: AB

Method: LAC10-107-06-1J

Verified: BR

## TKN using Lachet (water)

| Analyte  | Concentration<br>mg/L  | Quantitation Limit |
|----------|--|--------------------|
| TKN      | 1.2  | 0.05               |
| Comments | <i>An increase of 0.50mg/l was added to sample. 101.8% 6.02%rpd<br/>10/08/03ab</i> |                    |

Date Analyzed: 10-08-2003

Analyst: AB

Method: PAI DK03

Verified: TAB

## Total P (water) using Lachet

| Analyte              | Concentration<br>mg/L   | Quantitation Limit |
|----------------------|---|--------------------|
| Total Phosphate as P | 0.64  | 0.05               |
| Comments             | <i>A spike increase of 0.50mg/l was added to sample. 91.6% 100703ab</i> |                    |

Date Analyzed: 10-07-2003

Analyst: AB

Method: LAC10-115-01-1C

Verified: TAB

Continued on next page...



# Hygienic Laboratory

*The University of Iowa*

Page 3

Sample Number 200309652

## Description of units used within this report

mg/L - Milligrams per Liter

ug/L - Micrograms per Liter

Quant Limit - Lowest concentration reliably measured

Iowa Laboratory Certification No. 027. AIHA, NELAP, NVLAP, USEPA, and other credentials available upon request.

*If you have any questions please call Sherri Marine at 800/421-IOWA (4692) or 319/335-4500. Thank you.*

End of Report



# Hygienic Laboratory

*The University of Iowa*

Date of report: 10-20-2003

|||||  
ALEX SHEFFIELD  
ARCADIS  
2900 WEST FORK DRIVE  
SUITE 540  
BATON ROUGE LA 70827

Sample Number 200309653  
Date Received 09-24-2003  
Project TMDL LOUISIANA  
Date Collected 09-23-2003 12:00  
Collection Site can0001  
Collection Town  
Description water  
Reference BAYOU LAFOURCHE TMDL  
Collector SHEFFIELD/RULEY  
Phone (225) 292-1004  
Purchase Order

Comments Upon receipt at the UHL sample meets standard acceptance criteria.

## Results of Analyses

### Carbonaceous BOD (20day)

| Analyte                   | Concentration<br>mg/L  | Quantitation Limit |
|---------------------------|--|--------------------|
| Carbonaceous BOD (20 day) | 6  | 2                  |
| Comments                  | 20 day Blank depletion associated with this sample averaged 2.03 mg/L. Reported results based on a 150 ml dilution are not corrected for excessive blank depletion. If corrected the 20 day CBOD would be < 4 mg/L |                    |

Date Analyzed: 09-25-2003  
Method: SM 5210B

Analyst: RS/RWW  
Verified: LF

### Chlorophyll Determination for Water

| Analyte                 | Concentration<br>ug/L | Quantitation Limit |
|-------------------------|-----------------------|--------------------|
| Chlorophyll A           | 22                    | 1                  |
| Chlorophyll B           | 2                     | 1                  |
| Chlorophyll C           | 3                     | 1                  |
| Corrected Chlorophyll A | 20                    | 1                  |
| Pheophytin              | 2                     | 1                  |

Date Analyzed: 10-07-2003  
Method: SM 10200 H 2

Analyst: SMM  
Verified: MK

### Orthophosphate using Lachet (water)

| Analyte              | Concentration<br>mg/L | Quantitation Limit |
|----------------------|-----------------------|--------------------|
| Ortho Phosphate as P | 0.06                  | 0.02               |

Date Analyzed: 09-25-2003  
Method: LAC10-115-01-1A

Analyst: AB  
Verified: TAB

Continued on next page...



# Hygienic Laboratory

*The University of Iowa*

Page 2  
Sample Number 200309653

## Total Suspended Solids

| Analyte                | Concentration<br>mg/L         | Quantitation Limit |
|------------------------|-------------------------------|--------------------|
| Total Suspended Solids | 16                            | 1                  |
| Comments               | <i>Dried at 103 degrees C</i> |                    |

Date Analyzed: 09-26-2003

Analyst: MAG

Method: USGS I-3765-85

Verified: BR

## Nitrate + Nitrite as Nitrate N (Water)

| Analyte                         | Concentration<br>mg/L | Quantitation Limit |
|---------------------------------|-----------------------|--------------------|
| Nitrate + Nitrite Nitrogen as N | 0.3                   | 0.1                |

Date Analyzed: 09-25-2003

Analyst: MAG

Method: EPA 353.2

Verified: TAB

## Ammonia Lachet

| Analyte               | Concentration<br>mg/L | Quantitation Limit |
|-----------------------|-----------------------|--------------------|
| Ammonia Nitrogen as N | <0.05                 | 0.05               |

Date Analyzed: 10-02-2003

Analyst: AB

Method: LAC10-107-06-1J

Verified: BR

## TKN using Lachet (water)

| Analyte | Concentration<br>mg/L | Quantitation Limit |
|---------|-----------------------|--------------------|
| TKN     | 0.48                  | 0.05               |

Date Analyzed: 10-14-2003

Analyst: AB

Method: PAI DK03

Verified: LF

## Total Phosphorous in 0.02 to 0.50 range

| Analyte              | Concentration<br>mg/L | Quantitation Limit |
|----------------------|-----------------------|--------------------|
| Total Phosphate as P | 0.13                  | 0.02               |

Date Analyzed: 10-14-2003

Analyst: AB

Method: LAC10-115-01-1D

Verified: LF

## Description of units used within this report

mg/L - Milligrams per Liter

ug/L - Micrograms per Liter

Quant Limit - Lowest concentration reliably measured

Iowa Laboratory Certification No. 027. AIHA, NELAP, NVLAP, USEPA, and other credentials available upon request.

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End of Report



# Hygienic Laboratory

*The University of Iowa*

Date of report: 10-20-2003

|||||  
ALEX SHEFFIELD  
ARCADIS  
2900 WEST FORK DRIVE  
SUITE 540  
BATON ROUGE LA 70827

Sample Number 200309654  
Date Received 09-24-2003  
Project TMDL LOUISIANA  
Date Collected 09-23-2003 13:45  
Collection Site ms0293  
Collection Town  
Description water  
Reference BAYOU LAFOURCHE TMDL  
Collector SHEFFIELD/RULEY  
Phone (225) 292-1004  
Purchase Order

Comments Upon receipt at the UHL sample meets standard acceptance criteria.

## Results of Analyses

### Carbonaceous BOD (20day)

| Analyte                   | Concentration<br>mg/L  | Quantitation Limit |
|---------------------------|--|--------------------|
| Carbonaceous BOD (20 day) | 5  | 2                  |
| Comments                  | 20 day Blank depletion associated with this sample averaged 2.03 mg/L. Reported results based on a 150 ml dilution are not corrected for excessive blank depletion. If corrected the 20 day CBOD would be < 4 mg/L |                    |

Date Analyzed: 09-25-2003

Method: SM 5210B

Analyst: RS/RWW

Verified: LF

### Chlorophyll Determination for Water

| Analyte                 | Concentration<br>ug/L | Quantitation Limit |
|-------------------------|-----------------------|--------------------|
| Chlorophyll A           | 5                     | 1                  |
| Chlorophyll B           | < 1                   | 1                  |
| Chlorophyll C           | < 1                   | 1                  |
| Corrected Chlorophyll A | < 1                   | 1                  |
| Pheophytin              | 9                     | 1                  |

Date Analyzed: 10-07-2003

Method: SM 10200 H 2

Analyst: SMM

Verified: MK

### Orthophosphate using Lachet (water)

| Analyte              | Concentration<br>mg/L | Quantitation Limit |
|----------------------|-----------------------|--------------------|
| Ortho Phosphate as P | 0.10                  | 0.02               |

Date Analyzed: 09-25-2003

Method: LAC10-115-01-1A

Analyst: AB

Verified: TAB

Continued on next page...



# Hygienic Laboratory

*The University of Iowa*

Page 2  
Sample Number 200309654

## Total Suspended Solids

| Analyte                | Concentration<br>mg/L  | Quantitation Limit |
|------------------------|------------------------|--------------------|
| Total Suspended Solids | 52                     | 1                  |
| Comments               | Dried at 103 degrees C |                    |

Date Analyzed: 09-26-2003

Analyst: MAG

Method: USGS I-3765-85

Verified: BR

## Nitrate + Nitrite as Nitrate N (Water)

| Analyte                         | Concentration<br>mg/L | Quantitation Limit |
|---------------------------------|-----------------------|--------------------|
| Nitrate + Nitrite Nitrogen as N | 0.7                   | 0.1                |

Date Analyzed: 09-25-2003

Analyst: MAG

Method: EPA 353.2

Verified: TAB

## Ammonia Lachet

| Analyte               | Concentration<br>mg/L | Quantitation Limit |
|-----------------------|-----------------------|--------------------|
| Ammonia Nitrogen as N | 0.09                  | 0.05               |

Date Analyzed: 10-02-2003

Analyst: AB

Method: LAC10-107-06-1J

Verified: BR

## TKN using Lachet (water)

| Analyte | Concentration<br>mg/L | Quantitation Limit |
|---------|-----------------------|--------------------|
| TKN     | 0.60                  | 0.05               |

Date Analyzed: 10-08-2003

Analyst: AB

Method: PAI DK03

Verified: TAB

## Total Phosphorous in 0.02 to 0.50 range

| Analyte              | Concentration<br>mg/L | Quantitation Limit |
|----------------------|-----------------------|--------------------|
| Total Phosphate as P | 0.25                  | 0.02               |

Date Analyzed: 10-06-2003

Analyst: AB

Method: LAC10-115-01-1D

Verified: LF

## Description of units used within this report

mg/L - Milligrams per Liter

ug/L - Micrograms per Liter

Quant Limit - Lowest concentration reliably measured

Iowa Laboratory Certification No. 027. AIHA, NELAP, NVLAP, USEPA, and other credentials available upon request.

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End of Report



# Hygienic Laboratory

*The University of Iowa*

Date of report: 10-20-2003

|||||  
ALEX SHEFFIELD  
ARCADIS  
2900 WEST FORK DRIVE  
SUITE 540  
BATON ROUGE LA 70827

Sample Number 200309655  
Date Received 09-24-2003  
Project TMDL LOUISIANA  
Date Collected 09-23-2003 15:00  
Collection Site can0002  
Collection Town  
Description water  
Reference BAYOU LAFOURCHE TMDL  
Collector SHEFFIELD/RULEY  
Phone (225) 292-1004  
Purchase Order

Comments Upon receipt at the UHL sample meets standard acceptance criteria.

## Results of Analyses

### Carbonaceous BOD (20day)

| Analyte                   | Concentration<br>mg/L  | Quantitation Limit |
|---------------------------|--|--------------------|
| Carbonaceous BOD (20 day) | 5  | 2                  |
| Comments                  | 20 day Blank depletion associated with this sample averaged 2.03 mg/L. Reported results based on a 150 ml dilution are not corrected for excessive blank depletion. If corrected the 20 day CBOD would be < 4 mg/L |                    |

Date Analyzed: 09-25-2003  
Method: SM 5210B

Analyst: RS/RWW  
Verified: LF

### Chlorophyll Determination for Water

| Analyte                 | Concentration<br>ug/L | Quantitation Limit |
|-------------------------|-----------------------|--------------------|
| Chlorophyll A           | 4                     | 1                  |
| Chlorophyll B           | < 1                   | 1                  |
| Chlorophyll C           | < 1                   | 1                  |
| Corrected Chlorophyll A | 2                     | 1                  |
| Pheophytin              | 3                     | 1                  |

Date Analyzed: 10-07-2003  
Method: SM 10200 H 2

Analyst: SMM  
Verified: MK

### Orthophosphate using Lachet (water)

| Analyte              | Concentration<br>mg/L | Quantitation Limit |
|----------------------|-----------------------|--------------------|
| Ortho Phosphate as P | 0.08                  | 0.02               |

Date Analyzed: 09-25-2003  
Method: LAC10-115-01-1A

Analyst: AB  
Verified: TAB

Continued on next page...



# Hygienic Laboratory

*The University of Iowa*

Page 2  
Sample Number 200309655

## Total Suspended Solids

| Analyte                | Concentration<br>mg/L         | Quantitation Limit |
|------------------------|-------------------------------|--------------------|
| Total Suspended Solids | 100                           | 1                  |
| Comments               | <i>Dried at 103 degrees C</i> |                    |

Date Analyzed: 09-26-2003

Analyst: MAG

Method: USGS I-3765-85

Verified: BR

## Nitrate + Nitrite as Nitrate N (Water)

| Analyte                         | Concentration<br>mg/L | Quantitation Limit |
|---------------------------------|-----------------------|--------------------|
| Nitrate + Nitrite Nitrogen as N | 0.7                   | 0.1                |

Date Analyzed: 09-25-2003

Analyst: MAG

Method: EPA 353.2

Verified: TAB

## Ammonia Lachet

| Analyte               | Concentration<br>mg/L | Quantitation Limit |
|-----------------------|-----------------------|--------------------|
| Ammonia Nitrogen as N | 0.09                  | 0.05               |

Date Analyzed: 10-02-2003

Analyst: AB

Method: LAC10-107-06-1J

Verified: BR

## TKN using Lachet (water)

| Analyte | Concentration<br>mg/L | Quantitation Limit |
|---------|-----------------------|--------------------|
| TKN     | 0.70                  | 0.05               |

Date Analyzed: 10-08-2003

Analyst: AB

Method: PAI DK03

Verified: TAB

## Total Phosphorous in 0.02 to 0.50 range

| Analyte              | Concentration<br>mg/L | Quantitation Limit |
|----------------------|-----------------------|--------------------|
| Total Phosphate as P | 0.19                  | 0.02               |

Date Analyzed: 10-06-2003

Analyst: AB

Method: LAC10-115-01-1D

Verified: LF

## Description of units used within this report

mg/L - Milligrams per Liter

ug/L - Micrograms per Liter

Quant Limit - Lowest concentration reliably measured

Iowa Laboratory Certification No. 027. AIHA, NELAP, NVLAP, USEPA, and other credentials available upon request.

*If you have any questions please call Sherri Marine at 800/421-IOWA (4692) or 319/335-4500. Thank you.*

End of Report



# Hygienic Laboratory

*The University of Iowa*

Date of report: 10-20-2003

|||||  
ALEX SHEFFIELD  
ARCADIS  
2900 WEST FORK DRIVE  
SUITE 540  
BATON ROUGE LA 70827

Sample Number 200309656  
Date Received 09-24-2003  
Project TMDL LOUISIANA  
Date Collected 09-23-2003 16:00  
Collection Site ms0023-a  
Collection Town  
Description water  
Reference BAYOU LAFOURCHE TMDL  
Collector SHEFFIELD/RULEY  
Phone (225) 292-1004  
Purchase Order

Comments Upon receipt at the UHL sample meets standard acceptance criteria.

## Results of Analyses

### Carbonaceous BOD (20day)

| Analyte                   | Concentration<br>mg/L  | Quantitation Limit |
|---------------------------|--|--------------------|
| Carbonaceous BOD (20 day) | 4  | 2                  |
| Comments                  | 20 day Blank depletion associated with this sample averaged 2.03 mg/L. Reported results based on a 150 ml dilution are not corrected for excessive blank depletion. If corrected the 20 day CBOD would be < 4 mg/L |                    |

Date Analyzed: 09-25-2003  
Method: SM 5210B

Analyst: RS/RWW  
Verified: LF

### Chlorophyll Determination for Water

| Analyte                 | Concentration<br>ug/L | Quantitation Limit |
|-------------------------|-----------------------|--------------------|
| Chlorophyll A           | 4                     | 1                  |
| Chlorophyll B           | < 1                   | 1                  |
| Chlorophyll C           | < 1                   | 1                  |
| Corrected Chlorophyll A | < 1                   | 1                  |
| Pheophytin              | 7                     | 1                  |

Date Analyzed: 10-07-2003  
Method: SM 10200 H 2

Analyst: SMM  
Verified: MK

### Orthophosphate using Lachet (water)

| Analyte              | Concentration<br>mg/L | Quantitation Limit |
|----------------------|-----------------------|--------------------|
| Ortho Phosphate as P | 0.08                  | 0.02               |

Date Analyzed: 09-25-2003  
Method: LAC10-115-01-1A

Analyst: AB  
Verified: TAB

Continued on next page...



# Hygienic Laboratory

*The University of Iowa*

Page 2  
Sample Number 200309656

## Total Suspended Solids

| Analyte                | Concentration<br>mg/L         | Quantitation Limit |
|------------------------|-------------------------------|--------------------|
| Total Suspended Solids | 72                            | 1                  |
| Comments               | <i>Dried at 103 degrees C</i> |                    |

Date Analyzed: 09-26-2003

Analyst: MAG

Method: USGS I-3765-85

Verified: BR

## Nitrate + Nitrite as Nitrate N (Water)

| Analyte                         | Concentration<br>mg/L | Quantitation Limit |
|---------------------------------|-----------------------|--------------------|
| Nitrate + Nitrite Nitrogen as N | 0.8                   | 0.1                |

Date Analyzed: 09-25-2003

Analyst: MAG

Method: EPA 353.2

Verified: TAB

## Ammonia Lachet

| Analyte               | Concentration<br>mg/L | Quantitation Limit |
|-----------------------|-----------------------|--------------------|
| Ammonia Nitrogen as N | <0.05                 | 0.05               |

Date Analyzed: 10-02-2003

Analyst: AB

Method: LAC10-107-06-1J

Verified: BR

## TKN using Lachet (water)

| Analyte | Concentration<br>mg/L | Quantitation Limit |
|---------|-----------------------|--------------------|
| TKN     | 0.52                  | 0.05               |

Date Analyzed: 10-08-2003

Analyst: AB

Method: PAI DK03

Verified: TAB

## Total Phosphorous in 0.02 to 0.50 range

| Analyte              | Concentration<br>mg/L | Quantitation Limit |
|----------------------|-----------------------|--------------------|
| Total Phosphate as P | 0.26                  | 0.02               |

Date Analyzed: 10-06-2003

Analyst: AB

Method: LAC10-115-01-1D

Verified: LF

## Description of units used within this report

mg/L - Milligrams per Liter

ug/L - Micrograms per Liter

Quant Limit - Lowest concentration reliably measured

Iowa Laboratory Certification No. 027. AIHA, NELAP, NVLAP, USEPA, and other credentials available upon request.

*If you have any questions please call Sherri Marine at 800/421-IOWA (4692) or 319/335-4500. Thank you.*

End of Report



# Hygienic Laboratory

*The University of Iowa*

Date of report: 10-20-2003

|||||  
ALEX SHEFFIELD  
ARCADIS  
2900 WEST FORK DRIVE  
SUITE 540  
BATON ROUGE LA 70827

Sample Number 200309657  
Date Received 09-24-2003  
Project TMDL LOUISIANA  
Date Collected 09-23-2003 16:00  
Collection Site ms0023-b  
Collection Town  
Description water  
Reference BAYOU LAFOURCHE TMDL  
Collector SHEFFIELD/RULEY  
Phone (225) 292-1004  
Purchase Order

Comments Upon receipt at the UHL sample meets standard acceptance criteria.

## Results of Analyses

### Carbonaceous BOD (20day)

| Analyte                   | Concentration<br>mg/L  | Quantitation Limit |
|---------------------------|--|--------------------|
| Carbonaceous BOD (20 day) | 5  | 2                  |
| Comments                  | 20 day Blank depletion associated with this sample averaged 2.03 mg/L. Reported results based on a 150 ml dilution are not corrected for excessive blank depletion. If corrected the 20 day CBOD would be < 4 mg/L |                    |

Date Analyzed: 09-25-2003  
Method: SM 5210B

Analyst: RS/RWW  
Verified: LF

### Chlorophyll Determination for Water

| Analyte                 | Concentration<br>ug/L | Quantitation Limit |
|-------------------------|-----------------------|--------------------|
| Chlorophyll A           | 7                     | 1                  |
| Chlorophyll B           | < 1                   | 1                  |
| Chlorophyll C           | < 1                   | 1                  |
| Corrected Chlorophyll A | < 1                   | 1                  |
| Pheophytin              | 10                    | 1                  |

Date Analyzed: 10-07-2003  
Method: SM 10200 H 2

Analyst: SMM  
Verified: MK

### Orthophosphate using Lachet (water)

| Analyte              | Concentration<br>mg/L | Quantitation Limit |
|----------------------|-----------------------|--------------------|
| Ortho Phosphate as P | 0.08                  | 0.02               |

Date Analyzed: 09-25-2003  
Method: LAC10-115-01-1A

Analyst: AB  
Verified: TAB

Continued on next page...



# Hygienic Laboratory

*The University of Iowa*

Page 2  
Sample Number 200309657

## Total Suspended Solids

| Analyte                | Concentration<br>mg/L  | Quantitation Limit |
|------------------------|------------------------|--------------------|
| Total Suspended Solids | 75                     | 1                  |
| Comments               | Dried at 103 degrees C |                    |

Date Analyzed: 09-26-2003

Analyst: MAG

Method: USGS I-3765-85

Verified: BR

## Nitrate + Nitrite as Nitrate N (Water)

| Analyte                         | Concentration<br>mg/L | Quantitation Limit |
|---------------------------------|-----------------------|--------------------|
| Nitrate + Nitrite Nitrogen as N | 0.8                   | 0.1                |

Date Analyzed: 09-25-2003

Analyst: MAG

Method: EPA 353.2

Verified: TAB

## Ammonia Lachet

| Analyte               | Concentration<br>mg/L | Quantitation Limit |
|-----------------------|-----------------------|--------------------|
| Ammonia Nitrogen as N | <0.05                 | 0.05               |

Date Analyzed: 10-02-2003

Analyst: AB

Method: LAC10-107-06-1J

Verified: BR

## TKN using Lachet (water)

| Analyte | Concentration<br>mg/L | Quantitation Limit |
|---------|-----------------------|--------------------|
| TKN     | 0.49                  | 0.05               |

Date Analyzed: 10-08-2003

Analyst: AB

Method: PAI DK03

Verified: TAB

## Total Phosphorous in 0.02 to 0.50 range

| Analyte              | Concentration<br>mg/L | Quantitation Limit |
|----------------------|-----------------------|--------------------|
| Total Phosphate as P | 0.28                  | 0.02               |

Date Analyzed: 10-06-2003

Analyst: AB

Method: LAC10-115-01-1D

Verified: LF

## Description of units used within this report

mg/L - Milligrams per Liter

ug/L - Micrograms per Liter

Quant Limit - Lowest concentration reliably measured

Iowa Laboratory Certification No. 027. AIHA, NELAP, NVLAP, USEPA, and other credentials available upon request.

If you have any questions please call Sherri Marine at 800/421-IOWA (4692) or 319/335-4500. Thank you.

End of Report

## QC Summary for Samples collected at Bayou Lafourche

### CBOD20

|                    | Volume<br>(ml) | Initial DO<br>(mg/L) | Final DO<br>(mg/L) | Depletion<br>(mg/L) | BOD/CBOD<br>(mg/L) |                              |
|--------------------|----------------|----------------------|--------------------|---------------------|--------------------|------------------------------|
| Blank              | 300            | 8.31                 | 6.12               | 2.19                | 2.19               |                              |
| Blank              | 300            | 8.35                 | 6.48               | 1.87                | 1.87               |                              |
| Inhibited Blank    | 300            | 8.38                 | 6.12               | 2.26                | 2.26               |                              |
| Inhibited Blank    | 300            | 8.41                 | 6.62               | 1.79                | 1.79               |                              |
| Duplicate Results  |                |                      |                    |                     |                    |                              |
| Sample # 200309650 | 150            | 8.16                 | 5.63               | 2.53                | 5.06               | Sample/Duplicate RPD = 2.73% |
| Duplicate          | 150            | 8.24                 | 5.64               | 2.60                | 5.20               |                              |

### Total Suspended Solids

|                        | Volume<br>(ml) | Dish<br>Weight<br>Empty (g) | Dish<br>Weight<br>After<br>Drying (g) | Weight<br>Change<br>(mg) | Calculated<br>Solids (mg) | Reported<br>Solids<br>(mg) |  |
|------------------------|----------------|-----------------------------|---------------------------------------|--------------------------|---------------------------|----------------------------|--|
| TSS Blank              | 1000           | 1.0679                      | 1.0680                                | 0.00                     | 0.00                      |                            |  |
| TSS Reference Standard | 1000           | 1.0693                      | 1.0857                                | 16.40                    | 16.40                     |                            | TSS Reference Standard = 16.8 mg/L.<br>Percent Recovery = 97.62% |
| Duplicate Results      |                |                             |                                       |                          |                           |                            |  |
| Sample # 200309650     | 200            | 1.0670                      | 1.0849                                | 17.90                    | 89.50                     | 90                         | Sample/Duplicate RPD = 1.1%                                      |
| Duplicate              | 200            | 1.0757                      | 1.0934                                | 17.70                    | 88.50                     | 89                         |  |

### QC Summary for Samples collected at Bayou Lafourche

#### Nitrite + Nitrate as N

|                         | Conc.<br>(mg/L) | Percent<br>Recovery         |
|-------------------------|-----------------|-----------------------------|
| 1.0 mg/L NO3-N Standard | 1.0             | 98.0                        |
| 1.0 mg/L NO2-N Standard | 1.0             | 96.0                        |
| Spike Blank             | 3.3             | 95.0                        |
| Refence Standard        | 8.4             | 100.0                       |
| Duplicate Results       |                 |                             |
| Sample # 200309650      | 0.29            | Sample/Duplicate RPD = 7.1% |
| Duplicate               | 0.27            |                             |

#### Ammonia Nitrogen as N

|                            | Conc.<br>(mg/L) | Percent<br>Recovery          |
|----------------------------|-----------------|------------------------------|
| Reference Standard         | 1.1             | 94.2                         |
| Blank Spike                | 1.0             | 95.5                         |
| In-house Duplicate results |                 |                              |
| Sample                     | 7.933           | Sample/Duplicate RPD = 1.31% |
| Sample Duplicate           | 8.038           |                              |

#### Total Kjeldahl Nitrogen

|                    | Conc.<br>(mg/L) | Percent<br>Recovery |
|--------------------|-----------------|---------------------|
| Reference Standard | 0.540           | 102.2               |
| Spike Blank        | 0.500           | 100.6               |

## QC Summary for Samples collected at Bayou Lafourche

### Orthophosphate as P

|                    | Conc.<br>(mg/L) | Percent<br>Recovery |
|--------------------|-----------------|---------------------|
| Reference Standard | 0.283           | 94.6                |
| Spike Blank        | 0.476           | 95.2                |

### Total Phosphate as P

|                            | Conc.<br>(mg/L) | Percent<br>Recovery  |
|----------------------------|-----------------|--|
| Spike Blank                | 0.525           | 105  |
| In-house Duplicate results |                 |  |
| Sample                     | 0.052           | Sample/Duplicate Absolute Difference<br>= 0.01 mg/L. Within acceptable limits. |
| Sample Duplicate           | 0.042           |  |
| Sample Spike               | 0.586           | 106.4  |

### Chlorophyll

|                       | Accept.<br>Range | Conc.<br>(mg/L) |         |              |            |
|-----------------------|------------------|-----------------|---------|--------------|------------|
| Ref. Std. Low Chl. A  | 0.965-1.059      | 1.024           |         |              |            |
| Ref. Std. High Chl. A | 4.692-5.019      | 4.812           |         |              |            |
|                       | Chl. A           | Chl. B          | Chl. C  | Corr. Chl. A | Pheophytin |
| Reagent Blank         | <1 mg/L          | <1 mg/L         | <1 mg/L | <1 mg/L      | <1 mg/L    |
| Sample Blank          | <1 mg/L          | <1 mg/L         | <1 mg/L | <1 mg/L      | <1 mg/L    |
| Sample Blank          | <1 mg/L          | <1 mg/L         | <1 mg/L | <1 mg/L      | <1 mg/L    |

Sample blanks are analyzed after every 10 samples during chlorophyll analysis. The detection limit for chlorophyll analysis is 1.0 mg/L.



# Hygienic Laboratory

The University of Iowa

## CHAIN-OF-CUSTODY

|   |  |                                |                     |                           |                      |   |                           |   |   |   |   |   |   |   |    |   |   |
|---|--|--------------------------------|---------------------|---------------------------|----------------------|---|---------------------------|---|---|---|---|---|---|---|----|---|---|
| <b>Contact Name</b><br>Alex Sheffield               |  | <b>Phone</b><br>(225) 292-1004 |                     | <b>Analysis Requested</b> |                      |   |                           |   |   |   |   |   |   | <b>Purchase Order #</b>   |    |   |   |
| <b>Company</b><br>ALCADIS (Cadmus Group Team)       |  | <b>Fax</b><br>(225) 292-5210   |                     | CBOD <sub>20</sub> /TSS   | Chlorophyll $\alpha$ | T.Phy/MN3/TKN/Nitrite-Nitrate<br>(with Sulfuric Acid Preserv) | Dissolved Orthophosphorus |   |   |   |   |   |   | <b>Project Name and/or Number</b><br>Bayou Lafourche TMDL         |    |   |   |
| <b>Address</b><br>2900 West Fork Drive<br>Suite 520 |  |                                |                     |                           |                      |   |                           |   |   |   |   |   |   | <b>Collector's Phone #</b><br>(225) 292-1004                      |    |   |   |
| <b>City</b><br>Baton Rouge                          |  | <b>State</b><br>LA             | <b>Zip</b><br>70827 |                           |                      |   |                           |   |   |   |   |   |   | <b>Print Collector's Name</b><br>Alex Sheffield<br>Jennifer Ruley |    |   |   |
| <b>Sample ID/Description</b>                        |  | <b>Date</b>                    | <b>Time</b>         |                           |                      |   |                           |   |   |   |   |   |   | <b>Collector's Signature</b><br>Alex Sheffield                    |    |   |   |
|   |  |                                |                     | <b>Sample Matrix</b>      |                      |   |                           |   |   |   |   |   |   | <b>Comments/URL Sample Number</b>                                 |    |   |   |
|   |  |                                |                     | W                         | S                    | Other   |                           |   |   |   |   |   |   |   |    |   |   |
| 1. MS0023-A   |  | 9/23/2003                      | 4:00P               | X                         |                      |   | 1                         | 1 | 1 | 1 | 0 | 3 | 0 | 9   | 65 | 6 | UHL ID's: 1-259 (CBOD <sub>20</sub> /TSS), 1-230 (Chlor $\alpha$ ),<br>2-14 (Nutrients), 9-398 (Diss. Orthophos)  |
| 2. MS0023-B   |  | 9/23/2003                      | 4:00P               | X                         |                      |   | 1                         | 1 | 1 | 1 | 0 | 3 | 0 | 9   | 65 | 7 | UHL ID's: 1-256 (CBOD <sub>20</sub> /TSS), 1-238 (Chlor $\alpha$ ),<br>2-484 (Nutrients), 9-366 (Diss. Orthophos) |
| 3.  |  |                                |                     |                           |                      |   |                           |   |   |   |   |   |   |   |    |   |   |
| 4.  |  |                                |                     |                           |                      |   |                           |   |   |   |   |   |   |   |    |   |   |
| 5.  |  |                                |                     |                           |                      |   |                           |   |   |   |   |   |   |   |    |   |   |
| 6.  |  |                                |                     |                           |                      |   |                           |   |   |   |   |   |   |   |    |   |   |
| 7.  |  |                                |                     |                           |                      |   |                           |   |   |   |   |   |   |   |    |   |   |
| 8.  |  |                                |                     |                           |                      |   |                           |   |   |   |   |   |   |   |    |   |   |
| <b>Relinquished by</b>                              |  | <b>Date</b>                    |                     | <b>Time</b>               |                      | <b>Comments</b>   |                           |   |   |   |   |   |   |   |    |   |   |
| [Signature]   |  | 9-23-03                        |                     | 6:35 PM                   |                      |   |                           |   |   |   |   |   |   |   |    |   |   |
| <b>Relinquished by</b>                              |  | <b>Date</b>                    |                     | <b>Time</b>               |                      | <b>Comments</b>   |                           |   |   |   |   |   |   |   |    |   |   |
|   |  |                                |                     |                           |                      |   |                           |   |   |   |   |   |   |   |    |   |   |
| <b>Sample receiving custodian</b>                   |  | <b>Date</b>                    |                     | <b>Time</b>               |                      | <b>Sample Receipt Comments</b>                                |                           |   |   |   |   |   |   |   |    |   |   |
| Marcia Dawson                                       |  | 9-24-03                        |                     | 8:45                      |                      | 1-#1 each IC, 1-#, 1-#2, 1-#9 each DML                        |                           |   |   |   |   |   |   |   |    |   |   |



# Hygienic Laboratory

The University of Iowa

## CHAIN-OF-CUSTODY

|   |  |                                |             |  |  |   |   |   |   |   |   |   |   |   |   |   |                                   |  |
|---|--|--------------------------------|-------------|--|--|---|---|---|---|---|---|---|---|---|---|---|-----------------------------------|--|
| <b>Contact Name</b><br>Alex Sheffield                     |  | <b>Phone</b><br>(225) 292-1004 |             | <b>Analysis Requested</b>  |  |   |   |   |   |   |   |   |   | <b>Purchase Order #</b>   |   |   |                                   |  |
| <b>Company</b><br>ARCADIS (Cadmus Group Team)             |  | <b>Fax</b><br>(225) 292-5210   |             | CBOD <sub>20</sub> /TSS<br>Chlorophyll <i>a</i><br>T.Phos, NH <sub>3</sub> , TKN, Nitrate/Nitrite<br>Phos. Dissolved Orthophosphorus<br>(With Sulfuric Acid Preservative)<br>Dissolved Orthophosphorus |  |   |   |   |   |   |   |   |   | <b>Project Name and/or Number</b><br>Bayou Lafourche TMDL         |   |   |                                   |  |
| <b>Address</b><br>2900 West Fork Drive<br>Suite 540       |  |                                |             |  |  |   |   |   |   |   |   |   |   | <b>Collector's Phone #</b><br>(225) 292-1004                      |   |   |                                   |  |
| <b>City</b><br>Baton Rouge                                |  | <b>State</b><br>LA             |             |  |  |   |   |   |   |   |   |   |   | <b>Print Collector's Name</b><br>Alex Sheffield<br>Jennifer Ruley |   |   |                                   |  |
| <b>Zip</b><br>70827                                       |  |                                |             |  |  |   |   |   |   |   |   |   |   | <b>Collector's Signature</b><br><i>Alex Sheffield</i>             |   |   |                                   |  |
| <b>Sample ID/Description</b>                              |  | <b>Date</b>                    | <b>Time</b> | <b>Sample Matrix</b><br>W S Other  |  |   |   |   |   |   |   |   |   |   |   |   | <b>Comments/UHL Sample Number</b> |  |
| 1. MS0111   |  | 9/23/2003                      | 10:15A      | X  |  |   | 1 | 1 | 1 | 1 | 0 | 3 | 0 | 9   | 6 | 5 | 0                                 | UHL IDs: 1-591 (CBOD <sub>20</sub> /TSS), 1-249 (Chloro), 2-410 (Nutrients), 9-400 (Dis. Orthophos)                                |
| 2. MS0111 (MS)  |  | 9/23/2003                      | 10:15A      | X  |  |   | 1 | 1 | 1 | 1 | 0 | 3 | 0 | 9   | 6 | 5 | 1                                 | Matrix Spike to MS0111<br>UHL IDs: 1-247 (CBOD <sub>20</sub> /TSS), 1-601 (Chloro), 2-411 (Nutrients), 9-361 (Dis. Orthophos)      |
| 3. MS0111 (MSD)   |  | 9/23/2003                      | 10:15A      | X  |  |   | 1 | 1 | 1 | 1 | 0 | 3 | 0 | 9   | 6 | 5 | 2                                 | Matrix Spike Dup. to MS0111<br>UHL IDs: 1-244 (CBOD <sub>20</sub> /TSS), 1-555 (Chloro), 2-412 (Nutrients), 9-365 (Dis. Orthophos) |
| 4.  |  |                                |             |  |  |   |   |   |   |   |   |   |   |   |   |   |                                   |  |
| 5. CAN0001  |  | 9/23/2003                      | 12:00P      | X  |  |   | 1 | 1 | 1 | 1 | 0 | 3 | 0 | 9   | 6 | 5 | 3                                 | UHL IDs: 1-593 (CBOD <sub>20</sub> /TSS), 1-608 (Chloro), 2-426 (Nutrients), 9-354 (Dis. Orthophos)                                |
| 6. MS0293   |  | 9/23/2003                      | 1:45P       | X  |  |   | 1 | 1 | 1 | 1 | 0 | 3 | 0 | 9   | 6 | 5 | 4                                 | UHL IDs: 1-602 (CBOD <sub>20</sub> /TSS), 1-246 (Chloro), 2-448 (Nutrients), 9-422 (Dis. Orthophos)                                |
| 7. CAN0002  |  | 9/23/2003                      | 3:00P       | X  |  |   | 1 | 1 | 1 | 1 | 0 | 3 | 0 | 9   | 6 | 5 | 5                                 | UHL IDs: 1-258 (CBOD <sub>20</sub> /TSS), 1-227 (Chloro), 2-418 (Nutrients), 9-396 (Dis. Orthophos)                                |
| 8.  |  |                                |             |  |  |   |   |   |   |   |   |   |   |   |   |   |                                   |  |
| <b>Relinquished by</b><br><i>Alex Sheffield</i>           |  | <b>Date</b><br>9-23-03         |             | <b>Time</b><br>6:30 PM   |  | <b>Comments</b>   |   |   |   |   |   |   |   |   |   |   |                                   |  |
| <b>Relinquished by</b>                                    |  | <b>Date</b>                    |             | <b>Time</b>  |  | <b>Comments</b>   |   |   |   |   |   |   |   |   |   |   |                                   |  |
| <b>Sample receiving custodian</b><br><i>Marcia Dawson</i> |  | <b>Date</b><br>9-24-03         |             | <b>Time</b><br>8:45  |  | <b>Sample Receipt Comments</b><br>1-*/each IC, 1-*/1-42, 1-*/each TMDL 1C |   |   |   |   |   |   |   |   |   |   |                                   |  |

Custody Seal  
Alex Sheffield 9-23-2003

Custody Seal  
Alex Sheffield 9-23-2003

SEP 24 2003

Bayou Lafourche DO/Nutrients TMDL  
EPA Contract # 68-C-02-109, Task Order 0004  
Intensive Survey Analytical Results  
Analyses Performed by University of Iowa-University Hygienics Laboratory

| Sample Number | Date Collected | Collection Site | Test Description                | Result Sign | Result | Unit |
|---------------|----------------|-----------------|---------------------------------|-------------|--------|------|
| 200309650     | 9/23/2003      | mso111          | Carbonaceous BOD (20 day)       |             | 5      | mg/L |
| 200309650     | 9/23/2003      | mso111          | Chlorophyll A                   |             | 13     | ug/L |
| 200309650     | 9/23/2003      | mso111          | Chlorophyll B                   | <           | 1      | ug/L |
| 200309650     | 9/23/2003      | mso111          | Chlorophyll C                   | <           | 1      | ug/L |
| 200309650     | 9/23/2003      | mso111          | Corrected Chlorophyll A         |             | 7      | ug/L |
| 200309650     | 9/23/2003      | mso111          | Pheophytin                      |             | 10     | ug/L |
| 200309650     | 9/23/2003      | mso111          | Ammonia Nitrogen as N           |             | 0.08   | mg/L |
| 200309650     | 9/23/2003      | mso111          | Nitrate + Nitrite Nitrogen as N |             | 0.3    | mg/L |
| 200309650     | 9/23/2003      | mso111          | Ortho Phosphate as P            |             | 0.04   | mg/L |
| 200309650     | 9/23/2003      | mso111          | Total Phosphate as P            |             | 0.18   | mg/L |
| 200309650     | 9/23/2003      | mso111          | TKN                             |             | 0.7    | mg/L |
| 200309650     | 9/23/2003      | mso111          | Total Suspended Solids          |             | 90     | mg/L |
|               |                |                 |                                 |             |        |      |
| 200309651     | 9/23/2003      | mso111 ms       | Carbonaceous BOD (20 day)       |             | 5      | mg/L |
| 200309651     | 9/23/2003      | mso111 ms       | Chlorophyll A                   |             | 10     | ug/L |
| 200309651     | 9/23/2003      | mso111 ms       | Chlorophyll B                   | <           | 1      | ug/L |
| 200309651     | 9/23/2003      | mso111 ms       | Chlorophyll C                   | <           | 1      | ug/L |
| 200309651     | 9/23/2003      | mso111 ms       | Corrected Chlorophyll A         |             | 3      | ug/L |
| 200309651     | 9/23/2003      | mso111 ms       | Pheophytin                      |             | 10     | ug/L |
| 200309651     | 9/23/2003      | mso111 ms       | Ammonia Nitrogen as N           |             | 0.07   | mg/L |
| 200309651     | 9/23/2003      | mso111 ms       | Nitrate + Nitrite Nitrogen as N |             | 2.72   | mg/L |
| 200309651     | 9/23/2003      | mso111 ms       | Ortho Phosphate as P            |             | 0.59   | mg/L |
| 200309651     | 9/23/2003      | mso111 ms       | Total Phosphate as P            |             | 0.65   | mg/L |
| 200309651     | 9/23/2003      | mso111 ms       | TKN                             |             | 1.1    | mg/L |
| 200309651     | 9/23/2003      | mso111 ms       | Total Suspended Solids          |             | 120    | mg/L |
|               |                |                 |                                 |             |        |      |
| 200309652     | 9/23/2003      | mso111 msd      | Carbonaceous BOD (20 day)       |             | 5      | mg/L |
| 200309652     | 9/23/2003      | mso111 msd      | Chlorophyll A                   |             | 14     | ug/L |
| 200309652     | 9/23/2003      | mso111 msd      | Chlorophyll B                   | <           | 1      | ug/L |
| 200309652     | 9/23/2003      | mso111 msd      | Chlorophyll C                   | <           | 1      | ug/L |
| 200309652     | 9/23/2003      | mso111 msd      | Corrected Chlorophyll A         | <           | 1      | ug/L |
| 200309652     | 9/23/2003      | mso111 msd      | Pheophytin                      |             | 26     | ug/L |
| 200309652     | 9/23/2003      | mso111 msd      | Ammonia Nitrogen as N           |             | 0.07   | mg/L |
| 200309652     | 9/23/2003      | mso111 msd      | Nitrate + Nitrite Nitrogen as N |             | 2.83   | mg/L |
| 200309652     | 9/23/2003      | mso111 msd      | Ortho Phosphate as P            |             | 0.57   | mg/L |
| 200309652     | 9/23/2003      | mso111 msd      | Total Phosphate as P            |             | 0.64   | mg/L |
| 200309652     | 9/23/2003      | mso111 msd      | TKN                             |             | 1.2    | mg/L |
| 200309652     | 9/23/2003      | mso111 msd      | Total Suspended Solids          |             | 63     | mg/L |
|               |                |                 |                                 |             |        |      |
| 200309653     | 9/23/2003      | can0001         | Carbonaceous BOD (20 day)       |             | 6      | mg/L |
| 200309653     | 9/23/2003      | can0001         | Chlorophyll A                   |             | 22     | ug/L |
| 200309653     | 9/23/2003      | can0001         | Chlorophyll B                   |             | 2      | ug/L |
| 200309653     | 9/23/2003      | can0001         | Chlorophyll C                   |             | 3      | ug/L |
| 200309653     | 9/23/2003      | can0001         | Corrected Chlorophyll A         |             | 20     | ug/L |
| 200309653     | 9/23/2003      | can0001         | Pheophytin                      |             | 2      | ug/L |

| Sample Number | Date Collected | Collection Site | Test Description                | Result Sign | Result | Unit |
|---------------|----------------|-----------------|---------------------------------|-------------|--------|------|
| 200309653     | 9/23/2003      | can0001         | Ammonia Nitrogen as N           | <           | 0.05   | mg/L |
| 200309653     | 9/23/2003      | can0001         | Nitrate + Nitrite Nitrogen as N |             | 0.3    | mg/L |
| 200309653     | 9/23/2003      | can0001         | Ortho Phosphate as P            |             | 0.06   | mg/L |
| 200309653     | 9/23/2003      | can0001         | Total Phosphate as P            |             | 0.13   | mg/L |
| 200309653     | 9/23/2003      | can0001         | TKN                             |             | 0.48   | mg/L |
| 200309653     | 9/23/2003      | can0001         | Total Suspended Solids          |             | 16     | mg/L |
|               |                |                 |                                 |             |        |      |
| 200309654     | 9/23/2003      | ms0293          | Carbonaceous BOD (20 day)       |             | 5      | mg/L |
| 200309654     | 9/23/2003      | ms0293          | Chlorophyll A                   |             | 5      | ug/L |
| 200309654     | 9/23/2003      | ms0293          | Chlorophyll B                   | <           | 1      | ug/L |
| 200309654     | 9/23/2003      | ms0293          | Chlorophyll C                   | <           | 1      | ug/L |
| 200309654     | 9/23/2003      | ms0293          | Corrected Chlorophyll A         | <           | 1      | ug/L |
| 200309654     | 9/23/2003      | ms0293          | Pheophytin                      |             | 9      | ug/L |
| 200309654     | 9/23/2003      | ms0293          | Ammonia Nitrogen as N           |             | 0.09   | mg/L |
| 200309654     | 9/23/2003      | ms0293          | Nitrate + Nitrite Nitrogen as N |             | 0.7    | mg/L |
| 200309654     | 9/23/2003      | ms0293          | Ortho Phosphate as P            |             | 0.1    | mg/L |
| 200309654     | 9/23/2003      | ms0293          | Total Phosphate as P            |             | 0.25   | mg/L |
| 200309654     | 9/23/2003      | ms0293          | TKN                             |             | 0.6    | mg/L |
| 200309654     | 9/23/2003      | ms0293          | Total Suspended Solids          |             | 52     | mg/L |
|               |                |                 |                                 |             |        |      |
| 200309655     | 9/23/2003      | can0002         | Carbonaceous BOD (20 day)       |             | 5      | mg/L |
| 200309655     | 9/23/2003      | can0002         | Chlorophyll A                   |             | 4      | ug/L |
| 200309655     | 9/23/2003      | can0002         | Chlorophyll B                   | <           | 1      | ug/L |
| 200309655     | 9/23/2003      | can0002         | Chlorophyll C                   | <           | 1      | ug/L |
| 200309655     | 9/23/2003      | can0002         | Corrected Chlorophyll A         |             | 2      | ug/L |
| 200309655     | 9/23/2003      | can0002         | Pheophytin                      |             | 3      | ug/L |
| 200309655     | 9/23/2003      | can0002         | Ammonia Nitrogen as N           |             | 0.09   | mg/L |
| 200309655     | 9/23/2003      | can0002         | Nitrate + Nitrite Nitrogen as N |             | 0.7    | mg/L |
| 200309655     | 9/23/2003      | can0002         | Ortho Phosphate as P            |             | 0.08   | mg/L |
| 200309655     | 9/23/2003      | can0002         | Total Phosphate as P            |             | 0.19   | mg/L |
| 200309655     | 9/23/2003      | can0002         | TKN                             |             | 0.7    | mg/L |
| 200309655     | 9/23/2003      | can0002         | Total Suspended Solids          |             | 100    | mg/L |
|               |                |                 |                                 |             |        |      |
| 200309656     | 9/23/2003      | ms0023-a        | Carbonaceous BOD (20 day)       |             | 4      | mg/L |
| 200309656     | 9/23/2003      | ms0023-a        | Chlorophyll A                   |             | 4      | ug/L |
| 200309656     | 9/23/2003      | ms0023-a        | Chlorophyll B                   | <           | 1      | ug/L |
| 200309656     | 9/23/2003      | ms0023-a        | Chlorophyll C                   | <           | 1      | ug/L |
| 200309656     | 9/23/2003      | ms0023-a        | Corrected Chlorophyll A         | <           | 1      | ug/L |
| 200309656     | 9/23/2003      | ms0023-a        | Pheophytin                      |             | 7      | ug/L |
| 200309656     | 9/23/2003      | ms0023-a        | Ammonia Nitrogen as N           | <           | 0.05   | mg/L |
| 200309656     | 9/23/2003      | ms0023-a        | Nitrate + Nitrite Nitrogen as N |             | 0.8    | mg/L |
| 200309656     | 9/23/2003      | ms0023-a        | Ortho Phosphate as P            |             | 0.08   | mg/L |
| 200309656     | 9/23/2003      | ms0023-a        | Total Phosphate as P            |             | 0.26   | mg/L |
| 200309656     | 9/23/2003      | ms0023-a        | TKN                             |             | 0.52   | mg/L |
| 200309656     | 9/23/2003      | ms0023-a        | Total Suspended Solids          |             | 72     | mg/L |
|               |                |                 |                                 |             |        |      |
| 200309657     | 9/23/2003      | ms0023-b        | Carbonaceous BOD (20 day)       |             | 5      | mg/L |
| 200309657     | 9/23/2003      | ms0023-b        | Chlorophyll A                   |             | 7      | ug/L |
| 200309657     | 9/23/2003      | ms0023-b        | Chlorophyll B                   | <           | 1      | ug/L |
| 200309657     | 9/23/2003      | ms0023-b        | Chlorophyll C                   | <           | 1      | ug/L |

| <b>Sample Number</b> | <b>Date Collected</b> | <b>Collection Site</b> | <b>Test Description</b>         | <b>Result Sign</b> | <b>Result</b> | <b>Unit</b> |
|----------------------|-----------------------|------------------------|---------------------------------|--------------------|---------------|-------------|
| 200309657            | 9/23/2003             | ms0023-b               | Corrected Chlorophyll A         | <                  | 1             | ug/L        |
| 200309657            | 9/23/2003             | ms0023-b               | Pheophytin                      |                    | 10            | ug/L        |
| 200309657            | 9/23/2003             | ms0023-b               | Ammonia Nitrogen as N           | <                  | 0.05          | mg/L        |
| 200309657            | 9/23/2003             | ms0023-b               | Nitrate + Nitrite Nitrogen as N |                    | 0.8           | mg/L        |
| 200309657            | 9/23/2003             | ms0023-b               | Ortho Phosphate as P            |                    | 0.08          | mg/L        |
| 200309657            | 9/23/2003             | ms0023-b               | Total Phosphate as P            |                    | 0.28          | mg/L        |
| 200309657            | 9/23/2003             | ms0023-b               | TKN                             |                    | 0.49          | mg/L        |
| 200309657            | 9/23/2003             | ms0023-b               | Total Suspended Solids          |                    | 75            | mg/L        |